

As it is now known that the patient can become infected from intestinal contents, I see that her bowels are moved thoroughly, within twenty-four hours after delivery, with oil or salts.

In closing I wish to make a plea for the frequent use of forceps. Skill in their use can only be acquired by gentleness, patience and practice. With forceps and chloroform at our command, the day of long-agonizing labors should be of the past.

#### PRE-RETINAL HEMORRHAGE.\*

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I am persuaded that an exact diagnosis concerning the subject of this paper is at times not made with the result of serious prognostic error, detrimental to the physician. Apart from this practical consideration, the history I wish to report has several special interesting points, from the standpoint of the physiologist as well as pathological.

Regarding the name it seems to me best for the present to continue designating the hemorrhage as pre-retinal (and this is general in preference to "sub-hyaloid") for although there are now a few anatomical reports locating the blood behind the margo limitans interna, whilst it has been described in but one instance, I believe, as being absolutely in front of the retina, still the number of such examinations is so small as yet that it seems premature to adopt a new name (marginal hemorrhage e. g. after Elschnig) until we should find either that the retinal seat be really the usual one or be able to distinguish clinically between a pre-marginal and post-marginal hemorrhage. The physiological effect on vision in either of these cases would be the same and is anticipated somewhat by the term "pre-retinal."

Like other, though more common, ophthalmoscopic pictures, such as glaucomatous cupping, pre-retinal hemorrhage has been misread anatomically by the first observers, Esmarch and especially Liebreich,<sup>1</sup> who was the first to depict a typical case, locating the blood behind the retina. Although Leber,<sup>2</sup> in criticizing Liebreich's report had established the error of this view, Wecker and Landolt<sup>3</sup> still described the hemorrhage as being behind the retina. Similar differences are recorded in English literature, a review of which is to be found in the contributions of Haab,<sup>4</sup> Dimmer,<sup>5</sup> Levy and others. The hemorrhage between retina and vitreous, in its typical aspect, shows a horizontal straight outline at its upper border, being more or less semicircular below. It must be remembered, however, that this is neither the constant appearance in all cases, nor does it, where present, invariably persist throughout the whole course. It must further be borne in mind that the conclusion as to the blood being in front of the retina, can be arrived at immediately from the ophthalmoscopic appearance in those cases only where blood vessels have partly been covered thereby, or where the papilla has thus been hidden more or less. The usual and most characteristic occurrence for the hemorrhage, i. e. over the macula,

has been accompanied not infrequently by pre-retinal hemorrhages elsewhere in the fundus, and sometimes still further by other fundal changes; hemorrhages merely outside of the macula, on the other hand, have been reported much less often. Generally the several patches have been large, from 3 to 5 papilla breadths at the longest and mostly wider than high; when relatively massy the blood can break through into the vitreous. As a proof of the blood being a free and uniform mass the change of its straight upper border with inclining of the head has several times been observed—that line always returning to the horizontal. According to Leber (l. c.) the striking characteristic of the straight upper border comes only about after the blood corpuscles have sunk downwards, and the plasma above them has in many instances been seen ophthalmoscopically as a whitish area. Especially retinal veins, but also retinal arteries have been pronounced to be the source of bleeding. I omit a detailed account of minutiae of the ophthalmoscopic appearance, observed in some instances, e. g. a stellated figure in front of the blood, probably caused by a creasing of the hyaloid, or a white line circumscribing the whole patch in cases of larger hemorrhages, which line Haab (l. c.) looks upon as evidence of a process of agglutination and proliferation of endotheloid cells.

Histologic data are, as yet, wanting.\*

Regarding the etiology we may be brief. My impression from the literature makes me accept, on a whole, Haab's conclusion that every possible cause for retinal hemorrhage may, under favorable conditions, bring about such a one between retina and vitreous. Still the number of reports that safely might be used here for statistical purposes is not very large, however, one cannot help being struck that graver affections especially inflammatory processes accompanied by retinal hemorrhages, seem to be singularly without this complication. In a measure this conclusion is also borne out by the impression that younger people have oftener been affected than older ones. Hill Griffith (l. c.) gives the following figures regarding 83 cases of spontaneous intraocular hemorrhages without eye complications, excluding cases due to trauma, optic neuritis, nephritic retinitis, disseminated choroiditis, etc. He gives these causes for his cases: anomalies of blood, alterations of small vessels, stasis in heart disease, thrombotic and embolic processes. As to

\* An anatomical examination reported by Fisher (a case of subhyal. hemorrhage, etc., *Ophthalm. Hospit. Reports* xiv, ii) has not been accessible to me, but according to de Schweinitz (*Diseases of the Eye* V. ed., 1906) F. found that the hemorrhage had detached the internal limiting membrane from the retinal layers which had not been invaded and had occupied the space thus formed. That Anderson (V. Haab, l. c.) had made an anat. ex. appears to be erroneous according to Dimmer (l. c.) Hill Griffith (*Brit. Med. J.* of Nov. 12, 1904) was able to satisfy himself that the slight residue of the hemorrhage actually was in front of the retina. Unthoff (*Ibid.*) refers to a "pre-retinal" hemorrhage which anatomically proved to be under the limitans interna retinae. Also Benedek (V. Graefe's *Archiv.*, June, 1906, and *Zeitsch. f. Augenheilkde.*, April, 1907) publishes similar findings in 3 bulbi. In front of the relatively intact retina there was in all cases a rather thick (0.3-0.6 mm.) compact mass of blood being separated by the membrana limit interna from the vitreous.

\* Read before the San Francisco County Medical Society, and the San Francisco Society of Eye, Ear, Nose and Throat Surgeons.

the seat of the hemorrhages, 8 belonged to the vitreous, 14 were pre-retinal, and 20 retinal followed by exudation (hemorrhagic retinitis). Of the 14 cases of pre-retinal hemorrhage, 10 referred to females and 4 to males, and in all 83 cases there were 47 female and 36 male. More particularly according to the publications of Liebreich and Leber, it would seem that anemia and menstrual anomalies relatively often are causative factors.

Prognosis is good, the blood becoming absorbed in 3 to 6 months, and the histological structure of the retina not having been interfered with vision becomes normal again.

The history of my own patient is as follows:

Mrs. X., 36, physician's wife, born one child. With family history of rheumatism, patient has herself greatly suffered from such, which has led to an ankylosis of right elbow and a possible slight valvular impairment. No lues, no arterio-sclerosis. Suffers at times from menstrual irregularities, and is not a very robust woman, but strong minded and cheerful so that recent domestic anxieties have not had any marked effect on her general health. Blood and urine normal. No history of eye trouble, vision always excellent.

Menstruated on December 22, 1905. Patient noticed on same day a cloudiness before right eye, and in looking into a light this appeared red. An oculist consulted gave the worst possible prognosis quoad visum, explicitly on account of the hemorrhage having occurred "into" the macula. Next day my examination yielded the following status. With fully 1.75 distant vision and normal tension in affected eye, patient has a positive central scotoma with straight horizontal lower outline and semi-circular above—which figure she draws on paper. In looking at a window-pane, about 1 m distant, with a white house-wall, ca. 8 m off, as a background, the scotoma appears light red with green edges. One cm. perimeter test objects of Marx cloth, on black cloth without lustre, appear in good daylight at about reading distance as follows: Green like blue and blue as green, yellow is indistinctly recognized as such, and red as red,—the former objects have an edge of their true color around them, and so has white which appears reddish. Perimeter point-objects are not seen at all. The ophthalmoscopic examination reveals nothing abnormal, especially not regarding blood vessels, in the general fundus, but exactly in the macula is a light red hemorrhage about 1-3 pa. br. wide, of the same form as the scotoma, but reversed, i. e. straight border up. Above it are three small blood dots, and equidistant again above these is a small diffused shadowy hemorrhage at the end of a medium-sized vessel. This latter, the evident source of bleeding, appears clearly to be a branch of the main upper temporal artery. There are no reflexes from the macular region. At the next consultation, 4 days later, patient states that the scotoma has lost its regular sharp form and has got a "sort of handle" to it, and correspondingly the ophthalmoscope shows a picture in outline somewhat like a mushroom, with umbrella-shaped crown and stem, reversed, the hemorrhage now being of a brownish color with a few minute glittering dots in it. The explanation for this change is evidently that the several smaller extravasations have sunk down, and that in all the blood a process of absorption is already taking place. It still appears red subjectively, as before, under analogous conditions.

The eye has made an uneventful complete recovery in about 10 weeks, possibly a trace of negative scotoma remaining behind, and having become absolutely normal ophthalmoscopically. This state I have been able to reaffirm but some days ago, i.

e. ca. 28 months after the occurrence of the hemorrhage.

Twenty-eight days after the sudden onset of the affection in the right eye, also promptly with returning menstruation, the left eye became similarly affected, only much more mildly so. There is only a negative scotoma and a slight tinge of greenish to the white and blue, and of bluish to the green, 1 cm. perimeter objects. A light appears reddish particularly with the head turned away and the eye directed towards it strongly inwards across the nose. The macula appears light red and uniformly dotted with some faint, regular, relatively large, round spots, slightly darker. Fovea reflex present. No source for the apparent hemorrhage was visible, and no other changes. This finding has gradually disappeared in about 7 weeks and this eye has also remained well ever since. L. vis. I, 5 E.

Regarding the ophthalmoscopic features in the history just given, the smallness of the hemorrhage in either eye strikes us immediately, and that in the left the blood never formed itself into the supposed characteristic shape. I am inclined to think that the sparser the amount of blood in pre-retinal hemorrhage, the less important also the predisposing cause. I need scarcely point out that it is but too often far different with retinal hemorrhage proper. I have seen as a memento mori a retinal hemorrhage so small as to suggest in the inverted image almost the possibility of its being merely the darker spot you might notice at the crossing of two small vessels; 3 months later patient died of cerebral hemorrhage. Whilst, I believe, nothing is known in the pathology of rheumatism (re. vessels, etc.) which would help us to understand the etiology in this case, we might recur to the menstruation, and possibly some chlorotic condition. It is also worth while, I think, to bear in mind in future cases, the possibility of vicarious menstruation. Dr. J. Henry Barbat, to whom I am indebted for this patient, and I have thought that the simultaneous occurrence of hemorrhage and menstruation on two occasions might possibly be looked upon in that light. The feasibility of such a view seems well illustrated by the history of a young woman given by Dr. J. G. Huizinga who suffered from three attacks of hemorrhagic retinitis in three menstruations in immediate succession.\*

I have already given it as my belief that in cases at least like ours of lesser extent hemorrhage and underlying cause may run parallel in relative importance. I would look upon this hemorrhage then as analogous to recurring slighter hemorrhages into the vitreous (in young men more particularly) where often a chlorotic condition also is rather assumed clinically than being exactly demonstrable, which hemorrhages by the way originate in the anterior parts of the uveal tract, not from retinal vessels. Finally I am led to think that pre-retinal hemorrhage may in milder form occur oftener than suspected, not even at every time being recognizable with the ophthalmoscope as pre-retinal. Careful

\* The number of authentic cases of vicarious menstruation in the eye appears to be small (Cf. Groenouw, Graefe-Saemisch XI., 2 ed). Of such retinal hemorrhages Gr. only reports four by three authors, not giving the above case of Huizinga.

testing for central scotoma and with a light should, however, frequently aid in the exact diagnosis. Mine has certainly been an ideal patient making the perimetric test rather of the nature of an exact physiologic experiment. Still I rather wonder that in no contribution heretofore, as far as I am aware, the fact has been noted that, as a matter of course, the scotoma in the typical segment-shaped hemorrhage will be inverted to the form of its anatomical substratum\*\* Haab (l. c.) refers to his sixth patient as being very intelligent and a good observer, hence it had been possible to ascertain that she had a scotoma that corresponded in form "exactly" to the hemorrhage. Only Obermaier has it more directly, in parts viz., that the perimetric examination revealed for either eye a central scotoma with sharp "arch-like upper" border, there being a relative scotoma adjoining the absolute scotoma, downwards, corresponding to the upper transparent layer of fluid of the ophthalmoscopic picture.

In conclusion I wish to refer briefly to a few anatomical data that seem to be helpful for an understanding of the way in which the hemorrhage takes places. According to Marcus Gunn (quoted by Haab, l. c.) the hyaloidea is not as firmly attached to the retina in the macula as elsewhere. Rather plausible further is Dimmer's (l. c.) explanation. In the macular region according to Dogiel, Mueller's fibres frequently split into 2 or 3, some distance from the inner surface of the retina. The inner ends of these secondary fibres then, as they form the margo limitans, being much finer than the conical endings of Mueller's fibres elsewhere render it easier for a hemorrhage to break through at the macula.

#### REFERENCES.

- 1 Atlas d. Ophthalmoscopie Tab. VIII, fig. 2.
- 2 Graefe-Saemisch V, 1st ed.
- 3 Traite complet d'ophth. Tab. IV.
- 4 Deutschmann Beitrage Z. A., V.
- 5 Ibid., XV.

### THE BACTERIOLOGY AND PATHOLOGY OF PLAGUE.

(With the Demonstration of Gross and Microscopic Specimens.\*)

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It will be impossible to give a full account of this subject in the allotted time so I will simply review

\*\* The image of an outer object upon the retina is an inverted one, and the object is seen erect by a psychical process. In the language of Helmholtz we see the sun and stars an den Himmel not an dem Himmel, on to or into, not upon or in the sky. All retinal sensations are projected outwardly to the opposite side of the visual field, as is easily demonstrated by the simple experiment of pressure phosphene. If one presses the globe at the nasal side its bearer will experience the sensation of light (or dark) on the temporal side. It follows that entoptic phenomena originating behind the nodal point (in the sense of the reduced Donders' eye) are experienced outside of the eye inverted to their cause, and speaking teleologically there would seem to be no reason for a psychical act of reversing. Clinically the matter has not been used. I have tried in suitable cases, e. g. of grotesque vitreous opacities, to find in the outlines of the positive scotoma, as drawn by the patient, the contour of the ophthalmoscopic picture reversed, but have failed—evidently, the shadow from the formations as anticipated upon the retina from the frontal aspect is still largely modified by their corporeal structure posteriorly.

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a few facts which physicians and epidemiologists must always have in mind.

The exhibit of microscopic specimens should impress upon your minds the morphology, size and staining peculiarities of *Bacillus pestis*. I would call your particular attention to the preparation showing the "coccoid" form of *Bacillus pestis*, as these very characteristic forms are often encountered in the tissues of both rats and human beings. The exact manner in which these coccoid forms are produced in the animal body is still an open question. They are undoubtedly involution forms but viable for they always produce acute plague in experimental animals. I accidentally discovered that they could be produced in guinea pigs by the injection of the involution forms of *Bacillus pestis* grown on salt agar. It is probable that the salt content of the tissues has something to do with their production as shown by ash determinations kindly made for me by Mr. Beaver and Mr. Hyde of the Chemical Laboratory of the San Francisco Board of Health. The spleen and gland from a rat showing these coccoid forms and from a plague rat showing typical bipolar bacilli were examined and the tissues of the former contained about 0.5 per cent more solids by weight.

The bacteriologic identification of the plague bacillus, apart from animal experiments, depends chiefly upon two tests: The production of typical involution forms on salt agar containing two or three per cent of pure sodium chlorid and upon the production of typical salactite growths in oiled bouillon.

*Viability Outside the Animal Body*—Like many other nonspored organisms *Bacillus pestis* is very susceptible to the destructive agencies of nature. Exposure to direct sunlight (on coverglasses) kills it in an hour. Dried up in organs, on clothing, or in soil it dies in 5 to 15 days according to temperature conditions. Exposure to 55°C. (moist heat) for 15 minutes is fatal. One to 1000 bichlorid of mercury kills it immediately; and 5% carbolic in one minute. Like many other micro-organisms it may be frozen to many degrees below zero (Centigrade) without injury.

*Pathogenicity*—The plague bacillus is pathogenic to a number of animals besides man. In considering the susceptibility of animals it will be well to separate in your minds those that have been observed to acquire the disease *naturally* from those that may be infected *artificially*, e. g. by the injection of massive doses.

Among the rodents plague naturally occurs among the Norway rats (*M. Rattus*); the Egyptian roof rats (*M. rattus alexandrinus*); mice (*M. musculus*); the *Nesokia Bengalensis*—small bandicoots in India, closely resembling the Norway rat; the tarbagan (*Arctomys Bobac*) a rodent, related to the marmot, which inhabits the mountains in East Siberia and is also found in the Himalayas where epidemics of plague are said to decimate them. (Clemow. *Joun. Trop. Med.*, Feb. 1900.)

The observation of Liston that epizootic plague may run through guinea pigs gave the last Indian